

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

REC'D 08 JUN 2004

Applicant's or agent's file reference */#	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IT 02/00090	International filing date (day/month/year) 15.02.2002	Priority date (day/month/year) 29.01.2002
International Patent Classification (IPC) or both national classification and IPC B32B31/20, B32B31/20		
Applicant THERMO ENGINEERING SRL		


- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11.06.2003	Date of completion of this report 04.06.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Lanaspeze, J Telephone No. +49 89 2399-7735



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No.

PCT/IT 02/00090

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 2, 4-7

as originally filed

3A, 3B

received on 26.05.2004 with letter of 21.05.2004

Claims, Numbers

1-7

received on 26.05.2004 with letter of 21.05.2004

Drawings, Sheets

1/2-2/2

as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/IT 02/00090**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:
D1: US-A-4921569

2. Claim 1

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document) an installation for the continuous production of plastic laminates comprising:

- a cold press (see column 3, lines 17-26) with a lower plate (12) and an upper plate (11);
- a metal band (8) placed on the upper surface of the lower plate (12), which carries and draws inside the press components of the plastic laminates, which maintains continuous contact with a pair of electrodes (24a,24b), situated respectively at the entrance to and exit from the press, connected to the electric circuit of a generator of electric current of adequate power, so that, when said components of the plastic laminate have been drawn inside the press, the fraction of said metal band (8) comprised between the two electrodes (24a,24b) acts as an electric resistance.

The subject-matter of claim 1 therefore differs from this known apparatus essentially in that the metal band unwinds from a reel at the entry to the press and rewinds onto another reel at the exit.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention underlying the distinguishing features of claim 1 may therefore be regarded as improving the space available for installing the cold press.

In the installation of D1, the required pressure is exerted by two opposing plates respectively placed inside the loops formed by two continuous metal bands. This design obviously limits the space available for installing the pressing device. The other cited documents do not disclose nor suggest a carrying and heating metal band which unwinds from a reel at the entry to the press and rewinds onto

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IT 02/00090

another reel at the exit

Therefore, the solution proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT).

2. Claims 2-7

Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

3 A.

above all due to elimination of problems at present existing in the use of hot presses, and obtaining, within a short space of time, penetration of the heat to the packages closest to the centre of the pile.

- 5 As endothermic heating signifies that heat is actually generated at the level of each package, they all reach a uniform temperature within a short time which also signifies a shorter production cycle and higher quality products.

10 The drawback in making up the packages however remains, especially because a strip of copper, or of another highly conductive material, has to be wound serpentinely round the package formed of sheets of prepreg.

15 In certain special cases, this composition may become complex and irregular in view of the size of the laminates and of the need for ever greater accuracy in the production of printed circuits and multi-layer laminates.

Another problem arises over separating the packages in the pile as the copper strips passing from one package to another must be cut and trimmed.

- 20 It will be clear from the above that, in both processes, the fundamental part, namely the press which provides pressure and heat, assumes a role of almost secondary importance in terms of both cost and time.

*

25 The present disclosure overcomes the drawbacks referred to above and offers other considerable advantages as will now be described.

Subject of the disclosure is a continuous installation for producing both ordinary and multi-layer laminates, comprising a cold press with a lower fixed plate and an upper mobile one.

30 On the upper surface of the lower plate a metal band is laid for supporting and drawing along, inside the press, components of the plastic laminates consisting of bands of pre-preg and strips of copper.

3.B

*

5

The prior patent USA 4 921 569 discloses an installation for the continuous production of plastic laminates comprising a pair of ring-wise metal bands that draw the components of the plastic laminates inside the installation while maintaining continuous contact with a pair of electric resistances placed at the entrance to, and exit from, the press.

10

Two plates, situated inside the rings formed by the bands, exert pressure one against the other and therefore on the components. It will be clear that the presence of pressure plates inside the ring formed by the bands must inevitably create structural and functional problems.

NEW CLAIM

1. Installation (10) for production of plastic laminates including multi-layer laminates (110, 120, 130) comprising a cold press (11) with a fixed lower plate (12) and an upper mobile plate (13),
- 5 characterized in that electric motor-driven means unwind a metal band (20) from a reel (25) placed at entry to the press (11) and rewind it onto a reel (26) placed at the exit from the press, said metal band (20) supporting and drawing inside the press the components of the plastic laminates consisting of bands of pre-preg (70, 71, 80,
- 10 81) and strips of copper (50, 90) said band maintaining continuous contact with a pair of electrodes (30, 31), situated respectively at the entrance to and at the exit from the press, connected to the electric circuit of a generator (40) of electric current of adequate power so that, when said components of the plastic laminates have been
- 15 drawn inside the press, causing closure of both the press and the electric circuit, the fraction of said metal band (20) comprised between the two electrodes (30, 31) acts as an electric resistance generating the heat required for pressing.

CLAIMS

1. Continuous installation (10) for production of plastic laminates including multi-layer laminates (110, 120, 130) comprising a cold press (11) with a fixed lower plate (12) and an upper mobile plate (13),
characterized in that on the upper surface (15) of the lower plate (12) of the press (11) a metal band (20) is placed to carry and draw inside the press components of the plastic laminates consisting of bands of pre-preg (70, 71, 80, 81) and strips of copper (50, 90) maintaining continuous contact with a pair of electrodes (30, 31), situated respectively at the entrance to and exit from the press, connected to a generator (40) of electric current of adequate power, so that, when said components of the plastic laminates have been drawn inside the press, causing closure both of the press and of said electric circuit, the fraction of said metal band (20) comprised between the two electrodes (30, 31) acts as an electric resistance generating the heat required for pressing.
2. Continuous installation (10) as in claim 1,
characterized in that electric motor-driven means unwind the metal band (20) from a reel (25) placed at entry to the press (11) and rewind it onto a reel (26) placed at the exit.
- 2) ~~X~~ ~~Continuous~~ Installation (10) as in claims 1 and 2,
characterized in that the metal band (20) is of aluminium.
- 3) ~~X~~ ~~Continuous~~ Installation (10) as in claim 1,
characterized in that the bands of pre-preg (70, 71, 80, 81) and strips of copper (50, 90) are fed in from reels (75, 76, 82, 83) their onward movement being aided by electric motor-driven means.
- 4) ~~X~~ ~~Continuous~~ Installation (10) as in claim 1,
characterized in that the components (50, 70, 71, 80, 81, 90) of the plastic laminates comprise a group of components (70, 71) here called a lower group, placed to slide on the surface of a horizontal

structure (60) situated upstream of the press (11) substantially at the level of the metal band (20) for supporting and drawing the components along, placed inside the press itself.

5) ~~X~~ ~~Continuous~~ Installation (10) as in claim ~~X~~ 4,

5 characterized in that one or more rows of a number of multi-layer laminates (130) are placed on the fraction of the lower group (70,71) preset on the surface of the horizontal structure (60).

6) ~~X~~ ~~Continuous~~ Installation (10) as in claims 1 ~~(2)~~ and ~~X~~ 5)

characterized in that an electronic programming and control
10 processor coordinates opening and closure of the press (11), translation inside said press of the metal band (20) for supporting components and drawing them in, and the motor-driven means for feeding in the components (50, 70, 71, 80, 81, 90) of plastic laminates, regulating their working cycles.

15 7) ~~X~~ ~~Continuous~~ Installation (10) as in claims 1, ~~5~~ and ~~6~~ 4) and 5)
characterized in that, on completing introduction inside the press (11) of the components (50, 70, 71, 80, 81, 90) of the plastic laminates comprising, if present, multi-layer laminates (120), and after closure of said press to start the cycle, a fresh set of multi-
20 layers is placed on the lower group of components (70,71) on the depositing and sliding surface of the horizontal structure (60) upstream of the press, and in that on completion of the cycle when said press opens, the metal supporting band (20) extracts from the exit

25 of the press the laminates and multi-layer laminates (120) produced and simultaneously introduces, at entry to the press, the fresh fraction of components (50, 70, 71, 80, 81, 90) and therefore the multi-layer components (130) laid on the lower group of said components, to begin a new cycle.

30